

WHAT IS CLAIMED IS:

1 1. A system for capturing images of cells or cell structures, the system
2 comprising:
3 a cell holder comprising a plurality of sites in a spatial orientation, each of
4 the sites being capable of holding a plurality of cells to be imaged;
5 an image capturing device coupled to the cell holder, the image capture
6 device being adapted to capture at least one image in at least one of the plurality of sites;
7 an illumination apparatus comprising a liquid light guide coupled to the
8 plate for highlighting the plurality of cells in a relatively even spatial manner for image
9 capturing purposes;
10 an image processing device coupled to the image capturing device, the
11 image capturing device being adapted to convert the image into a digital representation;
12 and
13 a database storage device comprising a database management element
14 coupled to the image capturing device, the database storage device being adapted to
15 retrieve the digital representation of the image from the image processing device and
16 storing the digital representation.

1 2. The system of claim 1 further comprising a stage comprising a
2 device for moving the cell holder in a spatial direction to traverse across the cell holder in
3 the spatial orientation.

1 3. The system of claim 1 wherein the illumination apparatus
2 comprises sub-elements, at least one of the sub-elements being positioned away from the
3 image capturing device to prevent a possibility of vibration from the one sub-elements to
4 be transmitted to the image capturing device.

1 4. The system of claim 1 wherein the digital representation comprises
2 a plurality of regions and objects.

1 5. The system of claim 1 further comprising a computing device
2 connected between the database storage device and the image processing device.

1 6. The system of claim 1 wherein the image capturing device
2 comprises a magnification of at least 1X and greater to capture the image of the site.

1 ~~sub~~ 7. The system of claim 1 wherein the plurality of sites comprises at
2 least 96 sites.

1 8. The system of claim 1 wherein the liquid light guide characterized
2 as a flexible member that substantially prevents vibration from the an element of the
3 illumination apparatus to be transferred to the image capturing device.

1 9. The system of claim 1 wherein the spatial direction can be selected
2 from an x-direction, a y-direction, or a z-direction in a Cartesian coordinate system.

1 10. The system of claim 1 wherein the each of the sites comprises a
2 volume that is sufficient to prevent a solution therein from evaporating in a substantial
3 manner that may influence the image capturing.

1 11. A database system comprising:
2 a plate comprising a plurality of sites in a spatial orientation, each of the
3 sites being capable of holding a plurality of cells to be imaged;
4 an image capturing device to capture a plurality of images of at least one
5 of the sites, the image capturing device coupled to the plate;
6 an image processing device to combine a first image and a second image
7 from the plurality of images, the image processing device coupled to the image capturing
8 device, the image processing device being adapted to form a plurality of respective
9 features of the plurality of images; and
10 a database storage device comprising a database management element
11 coupled to the image processing device, the database storage device being adapted to
12 retrieve the plurality of features and store the plurality of features.

1 12. The system of claim 11 wherein the database storage device is
2 selected from an objected oriented database, a relational database, and a mixed database.

1 13. The system of claim 11 wherein each of the images comprises a
2 region and an object.

1 14. The system of claim 11 wherein the image capturing device
2 comprises a magnification of at least 1X and greater to capture the plurality of images of
3 the cells.

1 15. The system of claim 11 further comprising a light source
2 comprising a liquid light guide coupled to the plate for highlighting the plurality of cells
3 in a relatively even spatial manner for image capturing purposes.

1 16. A system for capturing cellular information from a population of
2 cells, the system comprising:
3 an image acquisition system comprising a charged coupled camera adapted
4 to capture an image of a plurality of manipulated cells, the illumination apparatus
5 providing for an acquisition of the image of the plurality of manipulated cells;
6 an illumination apparatus coupled to the image acquisition system for
7 highlighting the plurality of manipulated cells; and
8 a database system coupled to the image acquisition system, the database
9 system being adapted to be populated with information of the image of the plurality of
10 manipulated cells;
11 wherein the information comprises a plurality of descriptors, each of the
12 descriptors comprising a plurality of features, each of the features corresponding to a
13 cellular or subcellular component from the plurality of manipulated cells.

1 17. The system of claim 16 wherein the image is a digitized
2 representation of the plurality of manipulated cells, the digitized representation
3 highlighting each of the features of the plurality of manipulated cells.

1 18. The system of claim 16 wherein each of the features provides a
2 characteristic selected from at least a count, area, perimeter, length, breadth, fiber length,
3 fiber breadth, shape factor, elliptical form factor, inner radius, outer radius, mean radius,
4 equivalent radius, equivalent sphere volume, equivalent prolate volume, equivalent oblate
5 volume, equivalent sphere surface, average intensity, total intensity, optical density, radial
6 dispersion, texture difference, a population statistic value, and a spatial value the plurality
7 of manipulated cells.

1 19. A system for acquiring knowledge from cellular information, the
2 system comprising:
3 a database comprising a database management module ("DBMS");
4 a population module coupled to the DBMS for categorizing and storing a
5 plurality of features from an image processing device into the database;

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6 a translation module coupled to the DBMS for defining a descriptor from a
7 set of features from the plurality of features; and
8 a prediction module coupled to the DBMS for relating at least one of a
9 plurality of descriptors from the database based upon a selected descriptor from a selected
10 compound.

1 20. The system of claim 19 wherein the selected descriptor is for a
2 known compound.

1 21. The system of claim 19 wherein the selected descriptor is for an
2 unknown compound.

1 22. The system of claim 19 wherein the plurality of features are
2 provided for a plurality of known compounds and a plurality of unknown compounds.

1 23. The system of claim 19 wherein the selected compound includes a
2 plurality of properties.

1 24. The system of claim 23 wherein the properties is a mechanism of
2 action.

1 25. The system of claim 19 wherein the plurality of features comprise a
2 composite feature.

1 26. The system of claim 25 wherein the composite feature is a function
2 of at least a first feature and a second feature.

1 27. The system of claim 26 wherein the function is selected from an
2 algebraic function, a logical function, a statistical function, an arithmetic function, a
3 hyperbolic function, a sinusoidal function, and an exponential function.

1 28. The system of claim 19 wherein the plurality of features are
2 derived from an image acquisition device selected from an epifluorescent, a confocal, a
3 total-internal reflection, a phase, a Hoffman, a bright field, a dark field, a differential
4 interference contrast, an interference reflection, or a multi-photon illumination device.
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